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grounds. Dr. Leith states squarely that isostasy and rigidity in any high degree are mutually exclusive and as between the two he favors rigidity. The rigidity of the earth is a matter whose importance has been very generally passed over lightly, or carelessly swept aside by students of mountain building. But the brilliant determination of earth rigidity now in progress by Michelson, Gale, and Moulton firmly establishes the view favored by the author. The results seem indeed already to foreshadow that rigidity is the rock upon which not a few favorite theories are destined to be wrecked.

The average reader will perhaps be struck with the absence of numbered chapters. The framework of the book is really a skeleton outline—the familiar blackboard device of the systematic lecturer—with a few principal headings, under which are marshaled a graded series of sub-headings. The relative importance and correlation of these are rendered easy by different styles of type. For systematic study as well as classroom presentation this method has its advantages.

The treatment is strong and judicial; the discussion closely woven and effective, and while conciseness and brevity were doubtless sought, they result in very concentrated nourishment. The reviewer is of the opinion that the average working geologist will wish that the book were about twice as long. The treatise is a distinctly valuable contribution. It has no equal in its field.

R. T. C.

The Devonian and Mississippian Formations of Northeastern Ohio.

By CHARLES S. PROSSER. Geological Survey of Ohio, 4th Ser., Bulletin No. 15. Pp. ix+574, 33 plates. Columbus (1912), 1913.

The author devotes five chapters, or a major part of the bulletin, to a detailed description and discussion of the more important rock sections exposed in northeastern Ohio, together with observations on the fossils usually found associated therewith, and to a review of the literature bearing on the geology of that section of the state. This is followed by a chapter on correlation, and the bulletin concludes with the description and illustration of the major part of the Chagrin fauna, in which are included four new species and two new varieties.

The sections alone are a valuable addition to our knowledge of the geology of that region, as they bring out clearly the varying character of the rocks which have usually been classed together as a single forma-

tion. A great many of the sections and plates emphasize the importance of the erosional surface on which the Berea sandstone often rests.

The following classification of the rocks exposed in the region under discussion gives the formational relationships as used:

Pennsylvanian	{	Sharon conglomerate	
		Royalton formation	
		Sharpsville sandstone	
Mississippian	{	Orangeville formation	{ Brecksville shale
			{ Aurora sandstone
			{ Sunbury shale
		Berea grit	
		Bedford formation	
Devonian	{	Cleveland shale	
		Chagrin formation	

On the evidence of its fossil content, the author has definitely correlated the Chagrin formation with the Chemung of Western New York, and the Huron shale in general is regarded as the western stratigraphic equivalent of the Chagrin formation. The fact that the Cleveland shale thickens to the southwestward is observed to be due "largely to the downward encroachment of the black deposits upon the Chagrin" and to a similar "encroachment of the typical Cleveland black shales upon the lower deposits of the Bedford formation." To the eastward, however, the Cleveland shale is found to decrease in thickness and to be wanting in the sections near the Ohio-Pennsylvania line, possibly in all those east of the Grand River valley.

In the Bedford formation, the Euclid sandstone lentil near the base and the Sagamore sandstone lentil at a somewhat higher horizon are described. The disposition of the Bedford formation is not quite so clearly made but it apparently either thins out entirely before the Pennsylvania state line is reached or is represented by a part of the Venango sandstones and shales, possibly including the Riceville shale, of Pennsylvania. As evidence of its thinning out the finding of Chagrin fossils in deposits below but very near the base of the Berea sandstone is cited. "The results obtained in this bulletin seem to show conclusively that the Berea formation of Ohio is the western equivalent of the sandstone of western Crawford County, Pennsylvania, identified by Dr. White as the Corry sandstone and the subjacent Cussewago shales and Cussewago sandstone." The sections given for this eastern region show that the splitting up of the Berea sandstone begins at least as far west of the Pennsylvania state line as Windsor Mills, near the west line of Ashtabula County.

The most important change made in the classification, as formerly used, is the breaking up of the old Cuyahoga formation into the Orangeville formation, Sharpsville sandstone, and Royalton formation, while the Sunbury shale becomes merely a subdivision of the Orangeville. The two lower divisions of the Cuyahoga are considered to be the western extensions of the formations of the same names in western Pennsylvania, while the Royalton formation is apparently the Meadville, with perhaps also the Shenango, of the Pennsylvania classification.

This volume is by far the most important stratigraphic publication issued by the Geological Survey of Ohio in recent years. It deals with a part of the state which has been very much misunderstood by many of the former workers in that region and therefore misrepresented to the geological world. Undoubtedly the greatest importance of the bulletin lies in its bearing on the boundary line between the Devonian and Mississippian of Ohio, which is still a subject of much controversy. It appears that Dr. Prosser favors drawing this line at the base of the Berea sandstone, but he makes the statement that he "has not yet reached a positive conclusion concerning the age of this [Bedford] fauna," which is now used as marking the introduction of Mississippian sedimentation. The reader is therefore allowed to draw his own conclusions from the evidence presented.

C. R. S.

Geologische Diffusionen. Von RAPHAEL LIESEGANG. Dresden und Leipzig: Theodor Steinkopf.

The newer advances in mineralogy and petrology owe much to the work of the German chemists during the last quarter of a century. One of the most recent fields of investigation, which German workers have made peculiarly their own, is colloidal chemistry. The field is yet so new that geologists are only now beginning to realize the importance of its applications to their own science. At such a stage a book written from the point of view of the colloidal chemist is decidedly welcome. While it is today impossible for one man to be a specialist in two sciences; it is in the best interests of scientific progress that the applications of this branch of chemistry to geology be first made by an authority on colloids, rather than by a geologist. A study of the book before us is calculated to convince those who may be skeptical on this point.

The very special value of the book to the geologist lies in the detailed description of such experiments on the diffusion of colloids as may have